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BULLETIN

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New species of Uredineae — V

Joseph Charles Arthur

The following new species are presented as the result in part of critical study of general herbarium material and in part of recent collections kindly sent by the collectors or otherwise communicated. For the new material I am indebted to Messrs. E. W. D. Holway, P. H. Rolfs, C. F. Baker and Ernst A. Bessey, and extend hearty thanks for the same. The species come from various parts of western Canada, western and southern United States, Mexico and the West Indies. The assortment of species is more than usually interesting, as it embraces some belonging to little-known genera, and some that clarify knowledge of common forms.

In the preceding number of this series occur two errors needing correction. *Puccinia Dolichi* (Bull. Torrey Club **33**: 28) is an unwarranted name. Only the uredinia of the description belong to the species, the teliospores being yet unknown; but as the rust is on a leguminous host, they are more likely when found to belong to *Uromyces* than to *Puccinia*. The teliospores of the description, as pointed out recently by the collector, were stray spores from some Mexican euphorbiaceous plant transferred to the Cuban specimens by means of the drying papers. Until the teliospores are discovered it might be well to call the Cuban rust on *Dolichos*, **Uredo Dolichi.**

The second error is orthographical, and requires the substitution of *o* in place of *a* in the new generic name (*loc. cit.* page 30),

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which should read *Cerotelium.* The derivation is from κηρός, wax, and *telium* (from τέλος).

There are also errors in the recent paper on "North American species of *Peridermium*," by Arthur and Kern, published in the August number of this journal, which might be pointed out here. The host of *Peridermium Holwayi* (*loc. cit.* page 431) proves to be *Abies lasiocarpa* (Hook.) Nutt. This was ascertained by Professor Holway, who visited the type locality in August of this year in company with Mr. F. K. Butters, who knows the trees of the region well, and found that there can be no question regarding the error in the original determination. *Abies lasiocarpa* and *Pseudotsuga mucronata* have a similarity of appearance which makes it quite easy to mistake one for the other. It was found, however, that while the *Abies* is abundant in the type locality, the *Pseudotsuga* is entirely absent, although it does occur on slopes of the same mountains at a lower altitude. As no *Peridermium* has yet been correctly reported on *Pseudotsuga*, the lines referring to this host on page 411 should be cancelled, and the species with its corrected host transferred to the top of the next page to follow *P. pseudo-balsameum.* In the first column of the table, on page 405, *Abies* should be substituted for *Pseudotsuga.* Besides this, there is an erroneous citation of a host under *Peridermium Cerebrum*. On page 424 the three lines referring to *Pinus ponderosa* should be stricken out.

Uromyces Eleocharidis sp. nov.

II. Uredinia amphigenous, scattered, oblong, 0.3–1.5 mm. long, tardily dehiscent by one or more longitudinal slits, dark cinnamon-brown; urediniospores oblong to broadly oval, 15–19 by 19–29 μ, wall golden-yellow, medium thin, 1–1.5 μ, sparsely and finely echinulate; pores usually 3, approximately equatorial or superequatorial.

III. Telia amphigenous, thickly scattered, oblong, 0.5–2 mm. or more long, tardily dehiscent by longitudinal slits, chocolate-brown; teliospores angularly obovate, truncate or rounded above, narrowed below, 16–22 by 27–45 μ, wall light chestnut-brown, medium thin, 1–1.5 μ, thicker above, 7–10 μ, smooth; pedicel tinted, about one to one and a half times length of spore.

On *Eleocharis palustris* (L.) R. & S., Aberdeen, South Dakota, September, 1897, *David Griffiths* (West American Fungi *no. 60a,* type); Armstrong, Iowa, July 17, and August, 1886, *R. I. Cratty;* Rooks County, Kansas, December 7, 1894, *E. Bartholomew;* Racine, Wisconsin, October 27, 1901, *J. J. Davis;* Spirit Lake, Iowa, April 7, 1902, *J. C. Arthur;* Stockton, Kansas, March 7, 1906, *E. Bartholomew.* This rust has been known for some time, and has been listed under *Uromyces Junci.* It differs from that species, however, in a number of inconspicuous but positive characters. Comparing it with *U. Junci*, the dehiscence of the sori is brought about by longitudinal slitting of the overlying epidermis, and not by falling away of the epidermis, while the urediniospores are more inclined to oblong, with thinner walls, and a wholly unlike arrangement of the germ-pores. The teliospores are much alike in both species. When *Eleocharis* and *Juncus* stems are deprived of their upper and lower portions, as in most cryptogamic collections, they are quite similar in appearance, and not infrequently misnamed. They can be distinguished, however, by a cross-section of the stem, which in *Juncus* will show a rather uniform central pith, and in *Eleocharis* a number of large lacunae.

Uromyces insularis sp. nov.

II. Uredinia amphigenous, scattered, small, round, 0.1–0.4 mm. across, soon naked, dark cinnamon-brown, ruptured epidermis noticeable; urediniospores globoid, 19–23 by 23–25 μ, wall golden-brown, 1–1.5 μ thick, sparsely echinulate with conical points about 3 μ apart; pores 3, equatorial.

III. Telia amphigenous, scattered or oval, 0.2–0.8 mm. across, soon naked, light cinnamon-brown, ruptured epidermis noticeable; teliospores broadly lanceolate, rounded or obtuse at both ends, 15–18 by 29–39 μ, wall golden-yellow, thin, about 1 μ, apex usually bearing a hyaline umbo, 3–7 μ thick; pedicel hyaline, short, deciduous.

On *Clitoria cajanifolia* (Presl) Benth., near Dorado, Porto Rico, May 19, 1887, *I. Urban.* This species was found on sheet *no. 80339* of the phanerogamic herbarium of the Field Columbian Museum. Thanks are due the officers of the Museum for their kindness in permitting the writer to examine the collection for rusts. The species is very unlike *Uromyces Clitoriae* Arth., from Mexico, which has ellipsoid teliospores with thick, verrucose walls.

Puccinia inflata sp. nov.

O. Pycnia hypophyllous, crowded in orbicular groups, punctiform, prominent, pale yellowish or brownish, subepidermal, irregularly globoid, 100–120 μ ; sterigmata large.

II. Uredinia chiefly hypophyllous, scattered or gregarious, roundish, small, 0.1–0.3 mm. across, soon naked, somewhat pulverulent, cinnamon-brown, ruptured epidermis inconspicuous; urediniospores broadly obovate or ellipsoid, 21–25 by 26–33 μ, wall cinnamon-brown, medium thick, 1.5–2 μ, sparsely and sharply echinulate; pores 3 or 4, usually scattered, rarely equatorial.

III. Telia amphigenous, scattered or gregarious, roundish, small, 0.1–0.5 mm. across, soon naked, somewhat pulverulent, chocolate-brown, ruptured epidermis slightly evident; teliospores ellipsoid, 23–26 by 29–34 μ, rounded at both ends, slightly or not constricted at septum, wall chocolate-brown, uniformly thick, 4–5 μ, conspicuously reticulate, areolae 2–3 μ across; pedicel often attached more or less obliquely, colorless, once and a half to twice length of spore, with globose enlargement near the spore, which swells in water to 20–25 μ across.

On *Stigmatophyllon periplocifolium* (Desf.) Juss., Baracoa, Cuba, March 13, 1903, *E. W. D. Holway* (type); near Cayamas, Santa Clara Province, Cuba, October 13, 1904, *C. F. Baker 3538*. There is much similarity between this species and *Puccinia Echinopteridis* Holw. from Mexico. It has, however, smaller sori throughout, with more ellipsoid and smaller teliospores borne on longer and more slender pedicels. The surface-markings appear to be the same in the two species.

Puccinia Tridacis sp. nov.

O. Pycnia wanting.

III. Telia hypophyllous, numerous, small, 0.2–0.5 mm. across, scattered, or often gregarious and confluent in circinating groups 2–5 mm. across, early naked, ruptured epidermis inconspicuous, pulverulent, chestnut-brown; teliospores oblong or narrowly oblong, rounded or obtuse at apex, obtuse or narrowed at base, 13–17 by 40–58 μ, wall golden-brown, smooth, about 1 μ, thicker at apex, 6–10 μ, pedicel colorless, short, about one half length of spore.

On *Tridax procumbens* L., Punta Brava, Cuba, November 15, 1904, *Baker & O'Donovan 4039.* A leptopucciniaceous rust of the macroscopic appearance of *Puccinia Xanthii.*

Melampsora albertensis sp. nov.

II. Uredinia hypophyllous, numerous, scattered, round, 0.2–0.4 mm. across, early naked, pulverulent, pale-yellow, ruptured epidermis noticeable; paraphyses numerous, intermixed with the spores, clavate, 9–15 by 67–90 µ, wall colorless, 3–5 µ thick, smooth, stipe solid; urediniospores flattened laterally, when seen from the broad side broadly-elliptical, 16–19 by 23–27 µ, when seen from the narrow side oblong, 13–15 by 23–27 µ, wall colorless, 1.5–2 µ, much thickened on the flattened sides, 2.5–3.5 µ, evenly and sparsely verrucose-echinulate, without smooth spots.

III. Telia hypophyllous, numerous, small, irregular, often confluent, usually crowded in more or less extensive groups about the uredinia, subepidermal, waxy, orange-brown; teliospores prismatic, 10–13 by 29–39 µ, wall golden-brown, smooth, thin, about 1 µ, thicker above, 2–3 µ, with an evident apical germpore.

On *Populus tremuloides* Michx., Moraine Lake, Laggan, Alberta, Canada, September, 1906, *E. W. D. Holway.* An interesting species, being the second one on *Populus* recorded for America. It differs from the common species in the smaller urediniospores which have no smooth spot, and in having the teliospores slightly thickened above. The gross appearance of the fungus is also somewhat different.

Uredo biocellata sp. nov.

II. Uredinia amphigenous, scattered, round, large, 0.75–1.5 mm. across, subepidermal, without paraphyses or peridium, early naked, pulverulent, light chocolate-brown, ruptured epidermis noticeable; urediniospores broadly ellipsoid or obovate-globoid, 23–27 by 27–32 µ, wall light chestnut-brown, 1.5–2 µ thick, coarsely echinulate, depressed over the 2 opposite pores, but with the cuticle greatly inflated, nearly colorless, smooth, forming bullate areas 18–25 µ in diameter.

On *Pluchea purpurascens* (L.) DC., Florida Keys, 1898, *C. L. Pollard 143.* The inflated sides of the spores give them a conspicuously odd and distinctive appearance.

Uredo Holwayi sp. nov.

O. Pycnia hypophyllous, numerous, scattered, inconspicuous, subcuticular, pale-yellow, becoming brownish, frustum-like or sometimes columnar, 80–112 μ in diameter by 40–70 μ high.

II. Uredinia from a limited mycelium, hypophyllous, in two rows, on yellow spots occupying part or all of a leaf, subepidermal, roundish or oval, 0.1–0.3 mm. across, brownish-yellow, dehiscent by a small central orifice, ruptured epidermis not noticeable; peridium hemispherical, consisting of appressed hyphae, free at the orifice where they are 10–14 μ in diameter, with walls 3–4 μ thick; urediniospores borne singly on pedicels, broadly ellipsoid or obovate, 15–19 by 21–26 μ, wall nearly colorless, medium thick, 1.5–2.5 μ, strongly echinulate below with sharp points 1.5–2.5 μ apart, smooth above; pores obscure; contents orange-yellow when fresh.

On leaves of *Tsuga Mertensiana* (Bong.) Carr., Glacier, British Columbia, August 13, 1906, *E. W. D. Holway*. A unique rust for which no genus seems rightly constituted. It is physiologically an aecium, and possesses a peridium, but cannot be called *Aecidium* because the spores are borne singly on pedicels instead of being catenulate. In gross appearance it resembles an over-mature *Peridermium Peckii*, which has lost its protruding peridial cells. Its peridium, however, is not made up of distinct cells, as in *Peridermium*, but of compacted filaments, the ostiolar ends of which resemble paraphyses. The spores show considerable similarity to those of *Kuehneola*, and the pycnia also, but are still more like the pycnia of *Gymnoconia*. From these resemblances, the subcuticular pycnia, and other structural features, we may conclude that this is a heteroecious form, having Melampsora-like teliospores on some rosaceous host, or a host belonging to some small family. It may be furthermore assumed, in accordance with the general relationship pointed out by Tranzschel, that the telia will resemble those of the so-called *Chrysomyxa Abietis* on *Tsuga canadensis*, found in Massachusetts, and that the new genus will be closely related to *Pucciniastrum*.

Uredo Chaetochloae sp. nov.

II. Uredinia amphigenous, numerous, oblong to linear-oblong, about 0.1 mm. wide, 0.5–2 mm. or more long, soon dehiscent by a longitudinal rupture, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores broadly ellipsoid, 21–29 by 29–42 μ, wall chestnut-brown, 1.5–2 μ thick, sparsely and strongly echinulate with sharp conical points about 3 μ apart; pores 3, equatorial.

On *Chaetochloa macrosperma* Scribn. & Mer., Miami, Florida, March 25, 1903, *E. W. D. Holway* (type); May 15, 1906, *Ernst A. Bessey 41*. The sori of both collections are black, due to a fungous parasite. No teliospores could be found. The uredinia resemble those of *Puccinia atra* D. & H., but the spores are larger with echinulate instead of verrucose surface.

Caeoma strobilina sp. nov.

O. Pycnia conicolous, preceding and among the aecia, arising beneath the cortical layers, flattened, in more or less continuous layers, 130–160 μ high.

I. Aecia conicolous, subcorticular, usually covering the entire surface, causing hypertrophy, the scales becoming solidly united and turning prematurely reddish-brown; peridium wanting; aeciospores narrowly ellipsoid or broadly lanceolate, rarely globoid or obovoid, often attenuate below, 12–19 by 29–50 μ, wall colorless, about 1.5 μ thick, rather coarsely verrucose, with a smooth spot at base.

On cones of *Pinus palustris* Mill., East Palatka, Florida, May 30, 1906, *P. H. Rolfs* (type); *Pinus Taeda* L., Dunedin, Florida, June 20, 1901, *S. M. Tracy 7324;* Lake City, Florida, May 30 and July 10, 1906, *P. H. Rolfs.* This species, which appears not to be abundant, has probably been overlooked from its habit of growth on the cones of high trees, where it is generally inaccessible. The specimens, on which this description is based, were sent by Professor Rolfs in fresh condition. To him and to Mr. H. S. Fawcett, who ascended the trees for the type material, thanks are due for their enthusiastic search for specimens. Professor Rolfs reports seeing diseased cones, presumably of this species, in South Carolina between Charleston and Florence, as he journeyed on the Atlantic Coast Line Railway. When the cones are dead and dry, they usually fall to the ground, but then are so wormeaten and abnormal in appearance as to give little suggestion of bearing a rust. Such was the specimen sent by Professor Tracy, which was found on the ground. The fungus usually penetrates the whole cone, causing it to become much enlarged and of a brick-red color, being in strong contrast to the normal deep green of the immature cone. The scales of the cone become cemented together, and show no tendency to separate when mature and dry. After a time the sori open by breaking away the superposed tissues, and the whole surface is covered with the orange-yellow spores. As the cones become old and dry the powdery surface fades to white. There is no peridium, and consequently the species is not placed in the genus *Peridermium*. The species differs from *Caeoma conigenum* Pat., found in Mexico by P. Maury, in having spores with much thinner and less verrucose walls. There is much probability that these two species of *Caeoma* are the aecial forms of species of *Bubakia*, the rust on *Croton*. This is assumed from the fact that all known coniferous species of *Caeoma* belong to the *Uredinatae*, so far as their life histories have been ascertained. They have been previously collected only on leaves of *Abies* and *Larix* as aecia of species of the true genus *Uredo* (*Melampsora* of most authors). Two other American genera under this subfamily are known, *Physopella* and *Bubakia*, and of these the latter, judging by geographical distribution of its species, is the most likely to be associated with these species of *Caeoma* on *Pinus*, for the rust is so unlike those on *Abies* and *Larix* that it is not likely to belong to the same telial genus.

Aecidium Herrerianum sp. nov.

O. Pycnia hypophyllous, in small groups, 1 mm. or more across, surrounded by aecia, inconspicuous, subepidermal, almost wholly immersed, honey-yellow becoming dark-brown, flask-shaped, 80–110 μ broad by 80–100 μ high; ostiolar filaments 40–55 μ long.

I. Aecia hypophyllous, gregarious, crowded, cylindrical, long; peridium pale-yellow, margin erect, lacerate, peridial cells rhomboidal, 32–48 μ long, considerably overlapping, outer wall much thickened, 10–15 μ, transversely striate, inner wall thinner, 4–5 μ, moderately verrucose; aeciospores globoid, often angular, large, 23–26 by 27–33 μ, wall pale cinnamon-brown, thick, 3–4 μ, moderately verrucose.

On *Senecio salignus* DC., Hacienda of San Joaquin, District of Tulancingo, State of Hidalgo, Mexico, May, 1906, *A. L. Herrera* of the Comision de Parasitologia Agricola; communicated by E.

W. D. Holway. A very conspicuous aecium on account of its long peridium, and the large, dark-colored spores.

Aecidium Sorbi sp. nov.

O. Pycnia epiphyllous, numerous, gregarious, in small groups on discolored areas, noticeable, subepidermal, honey-yellow becoming brownish, conoidal, 110–130 μ in diameter, 70–80 μ high; ostiolar filaments 30–45 μ long.

I. Aecia hypophyllous, numerous, gregarious, in small groups of 4 to 7, arising from slight swellings on discolored spots, or often more numerous on larger swellings on the veins or rachis, cupulate, 0.2–0.4 mm. high by 0.2–0.3 mm. across; peridium colorless, margin nearly erect, erose, peridial cells rhomboidal, 30–45 μ long, slightly overlapping, lumen small, outer wall much thickened, 10–13 μ, transversely striate, smooth, inner wall thinner, 3–5 μ, somewhat striate, moderately verrucose; aeciospores broadly ellipsoid, usually somewhat angular, 23–27 by 27–39 μ, wall colorless, thick, 3–4 μ, minutely verrucose.

On *Sorbus occidentalis* (Wats.) Greene, Hodag Lake, Vancouver Island, British Columbia, Canada, August 8, 1905, *F. K. Butters;* communicated by E. W. D. Holway. A very distinct species of *Aecidium*, and especially interesting as it is the second one so far known on a pomaceous host.

Aecidium pulverulentum sp. nov.

O. Pycnia epiphyllous, numerous, gregarious, in rather small indeterminate groups, not crowded, conspicuous, punctiform, subcuticular, becoming blackish-brown, hemispherical, 80–140 μ in diameter, 40–50 μ high; without ostiolar filaments; pycniospores numerous above a flat hymenium.

I. Aecia hypophyllous, numerous in indefinite groups, not much crowded, cylindrical, deep-seated, small, about 0.1 mm. in diameter, pulverulent; peridium colorless, evanescent, peridial cells rather thin, 30–45 μ long, overlapping, easily separating, outer wall smooth, inner wall rather coarsely verrucose; aeciospores angularly globoid or ellipsoid, or elongate-polyhedral, sometimes broader above, 23–29 by 24–32 μ, wall light cinnamon-brown fading to almost colorless, thick, 3–5 μ, much thicker above, 7–13 μ, noticeably and strongly verrucose.

On *Randia sp.*, Cuernavaca, State of Morelos, Mexico, October 30, 1903, *E. W. D. Holway 5275* (type); Chapala, State of

Jalisco, Mexico, October 5, 1903, *Holway 5115*. The two collections are apparently on different species of *Randia*. This is a peculiar form of rust. From the subcuticular pycnia, the unusually small aecia, and the strongly verrucose spores it is evident that it does not belong under the *Dicaeomatae*, *i. e.*, to any of the usual forms of *Puccinia* or *Uromyces*; but its true affinities are not apparent.

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